

***Pseudagrion woodlarkensis* sp. nov., a new damselfly species from Woodlark Island, Papua New Guinea (Odonata: Coenagrionidae)**

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Pseudagrion woodlarkensis sp. nov., a new damselfly species from Woodlark Island, Papua New Guinea, is described and male and female characters are illustrated. The new species differs from all regional congeners by having a predominantly yellow thorax with bold black stripes, and males can be clearly distinguished from all Papuan *Pseudagrion* species by the complex and characteristic cerci which bear an inner process that is oriented obliquely upwards and directed posteriorly. Description of this species brings the number of *Pseudagrion* species currently known from the Papuan biogeographic subregion to 17.

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Introduction

The coenagrionid genus *Pseudagrion* Selys, 1876 is distributed throughout Africa, southern and eastern Asia (Michalski, 2012) and Australasia and currently comprises about 150 described species (cf. Schorr & Paulson, 2015). It is defined by a suite of characters including the anal vein originating at or slightly proximal to anal crossvein, Pt similar in all wings, male cerci usually notched or forked, female posterior pronotal lobe with a pair of anteriorly directed horns, and females lacking a vulvar spine on venter of abdominal segment 8 (Selys, 1876). Based on molecular evidence, the genus is in need of reclassification (Dijkstra, Kalkman, Dow, Stokvis, & van Tol, 2014).

There are currently 12 species of *Pseudagrion* recorded from the region covering New Guinea, the Bismarck Archipelago and the Solomons, the most recent additions being *Pseudagrion fumipennis* Polhemus, Michalski & Richards, 2008 which is widespread in New Guinea, and the New Britain endemic *Pseudagrion lorenzi* Gassmann, 2011 (see also Gassmann, 2015; Gassmann & Richards, 2011). Gassmann (2011) listed all hitherto known regional members of the genus and distinguished between three groups based on coloration: (1) predominantly blue species, among them the widespread *P. microcephalum* (Rambur, 1842); (2) predominantly dark

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species with thorax overlain by bluish pruinosity, including the only known species with dark wing apices, *P. fumipennis*; (3) largely yellow or yellow-orange species (with at least the head bright yellow).

Here we describe and illustrate a new species belonging to the third group, bringing the number of yellow-faced *Pseudagrion* species known from this region to five.

Materials and methods

All specimens examined are deposited in the South Australian Museum, Adelaide, Australia (SAMA). Unless stated otherwise, coloration as described in the systematic part refers to preserved specimens. Measurements of the wing and abdomen were taken with a precision of 0.5 mm. Descriptive terminology of wing venation follows the modified Tillyard–Fraser system used by Watson and O’Farrell (1991).

Pseudagrion woodlarkensis sp. nov. (Figures 1–6)

Material studied

Holotype ♂ (SAMA 07-001426), Papua New Guinea, Milne Bay Province, Woodlark Island, Talpos River (09°10.038’S, 152°46.779’E; 52 m asl), 13 April 2011, leg. S.J. Richards. *Paratype* ♀ (SAMA 07-001427), Papua New Guinea, Milne Bay Province, Woodlark Island, Ladawabu Creek (09°09.204’S, 152°46.639’E, 108 m asl), 13 April 2011, leg. S.J. Richards.

Etymology

The specific epithet refers to Woodlark Island in Milne Bay Province, Papua New Guinea, where this species was found.



Figure 1. A male *Pseudagrion woodlarkensis* photographed in the field at Talpos River, Woodlark Island (Photo: S.J. Richards).

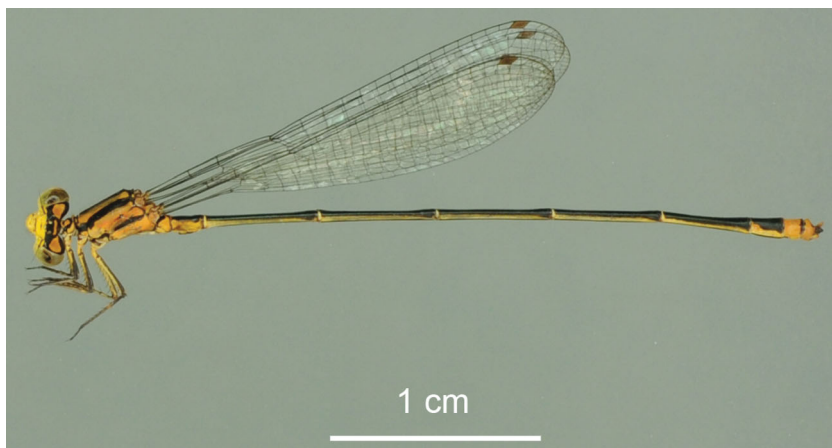


Figure 2. *Pseudagrion woodlarkensis*, holotype ♂, Woodlark Island, Talpos River: habitus.

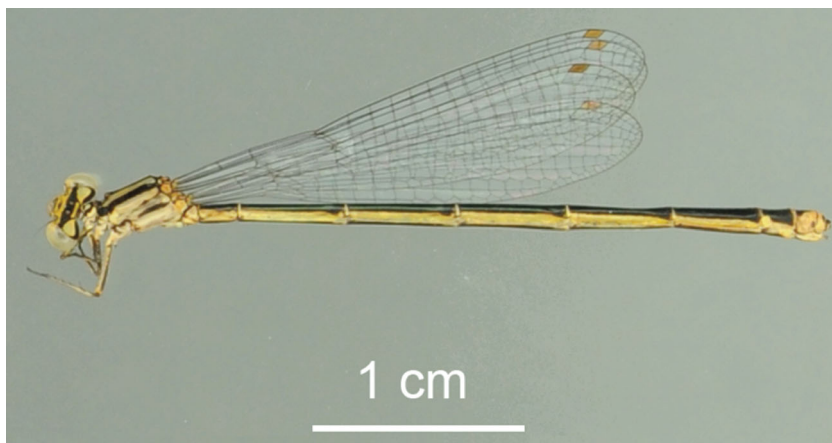


Figure 3. *Pseudagrion woodlarkensis*, paratype ♀, Woodlark Island, Ladawabu Creek: habitus.

Diagnosis

A yellow-faced, largely yellow-orange (males) or yellow-white (females) species with conspicuous black markings on head and synthorax and black abdominal dorsum. Distinguished from other regional yellow-faced *Pseudagrion* by the distinct broad black stripes on synthorax. Males distinguished from all other Papuan *Pseudagrion* by the complex and characteristic cerci which bear an inner process that is oriented obliquely upwards and directed posteriorly.

Male (Holotype, Figures 2, 4a, b, 5a–d)

Head. Labium with median cleft of oval shape, subacute apically; colour, including movable hook and end-hook, yellow-white. Labrum, clypeus and frons up to level of anterior ocellus bright yellow, except for black along sutures. Antennae with socket and scapus bright yellow; pedicellus and flagellum dark brown. Two distinct, crescent-shaped bright yellow markings joining outer posterior sides of anterior ocellus. A diffuse orange, oval-shaped spot anterolaterally contacting either posterior ocellus. Vertex otherwise dull black. Occiput of same colour, except



Figure 4. *Pseudagrion woodlarkensis*, holotype ♂: (a) head; (b) head, legs and thorax.

for a pair of large orange subtriangular postocellar spots and a median orange stripe anteriorly joining occipital ridge (Figure 4a).

Thorax. Prothorax in lateral view with median lobe flat, unmodified. Posterior pronotal lobe short, broadly rounded, only slightly elevated. Coloration of pronotum black, with bright-orange markings shaped as follows: anterior pronotal margin entirely bright orange; median lobe with a pair of roughly crescent-shaped central markings which nearly contact each other, diverging anteriorly and confluent with the bright coloration of the anterior lobe; a subrectangular marking situated laterally on either side of the central markings, connecting to them (Figure 4a).

Legs with coxae and trochanter pale yellow except for minor diffuse blackish marks covering upper anterior surfaces of coxae. Posterior surface of all femora black, partially interrupted by

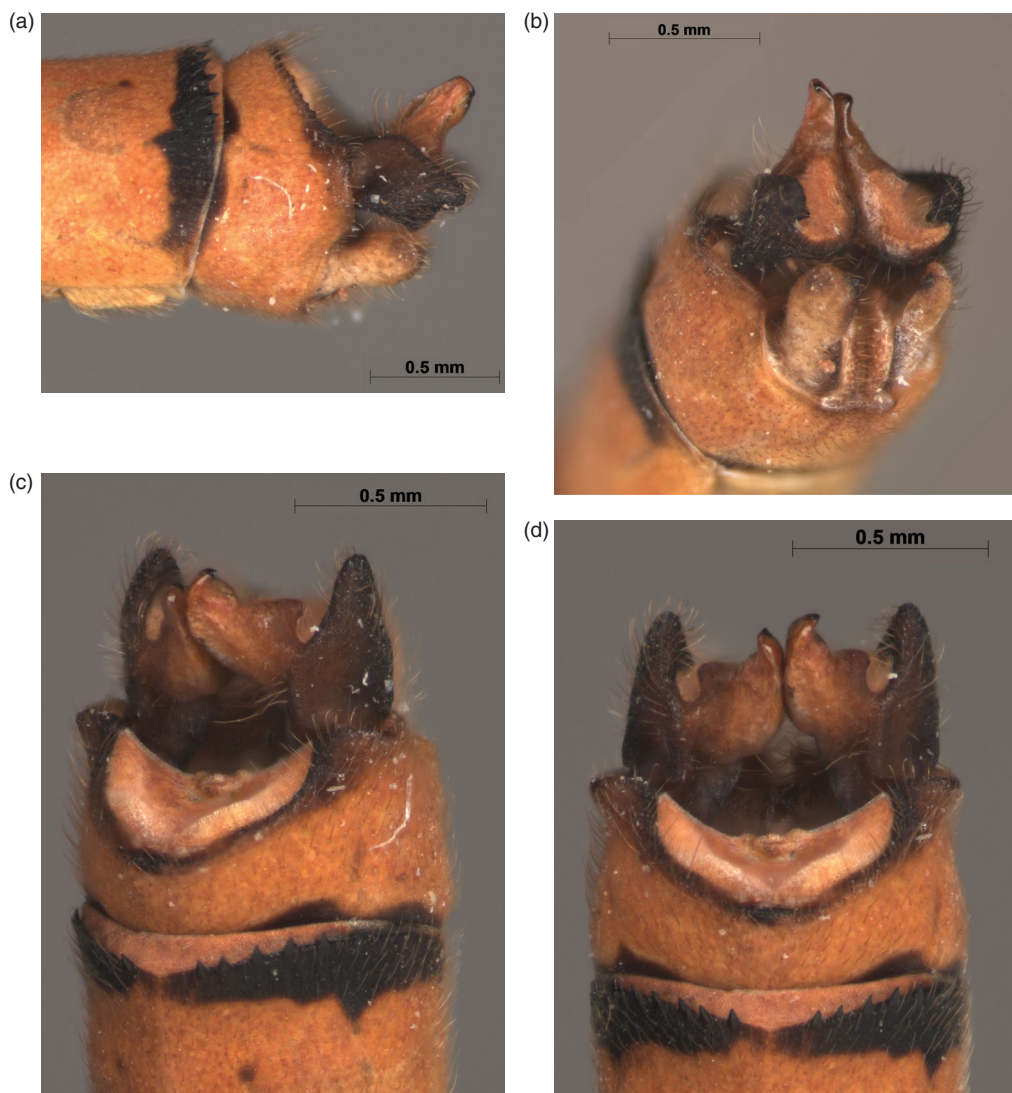


Figure 5. *Pseudagrion woodlarkensis*, holotype ♂: anal appendages: (a) left lateral view; (b) left ventrolateral view; (c) left dorsolateral view; (d) dorsal view.

diffuse subproximal and subdistal yellow markings. Anterior sides of tibiae pale yellow. Tarsi light brown to black (proximal parts and tips). All femoral and tibial spines black.

Synthorax bright yellow-orange with conspicuous black stripes. Antehumeral stripe continuous, of about the same width as black stripe covering dorsal carina. A distinct broad black stripe covering humeral suture, continuing anteriorly on mesokatepisternum, connected posteriorly both with carinal stripe and with black line that covers ante-alar ridge. First lateral suture with a black spot marking beginning of posterior third of suture's length and a rudimentary black line covering one quarter of the suture posteriorly (Figure 4b). Metakatepisternum dirty yellow, upper and posterior margins marked with black. A black stripe in contact with and above 2nd lateral suture, covering its posterior end. Metepimeron largely orange, upper and anterior margin grey to black. Underside of synthorax yellow-white, except for a pair of diffuse medium brown spots on poststernum.

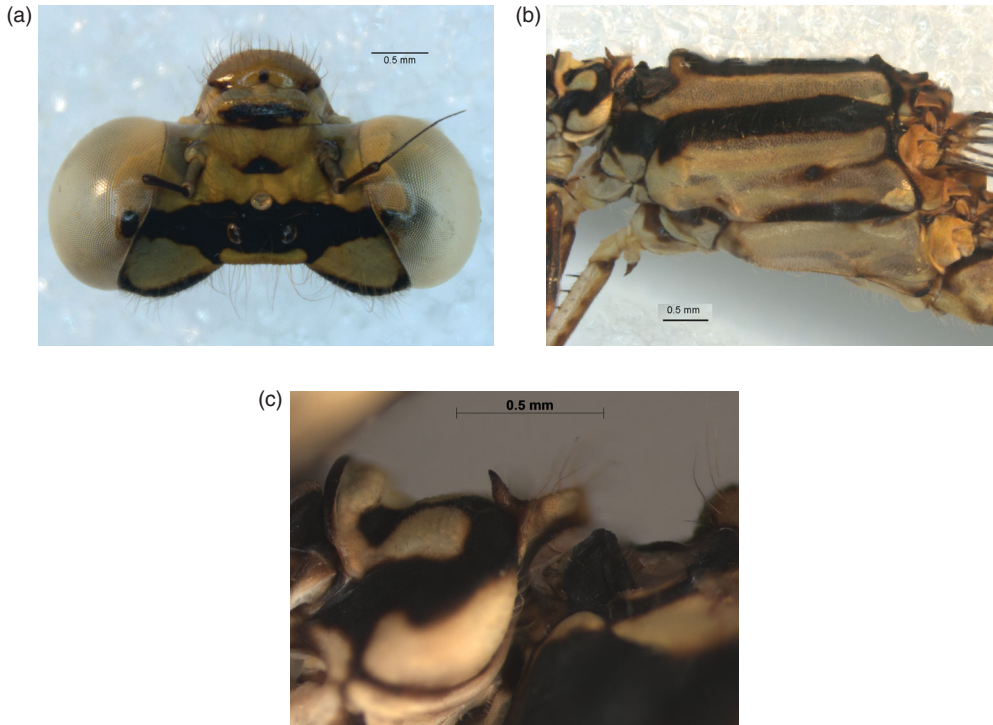


Figure 6. *Pseudagrion woodlarkensis*, paratype ♀: (a) head; (b) pro- and synthorax; (c) prothorax (detail).

Wings clear; Pt oblique, near-rhombic, anterior distal corner slightly protruded, medium brown. Fw with 14–15 Px, Hw 12–13 Px.

Abdomen. Dorsum of S1 to 8 entirely black in dorsal view, with a metallic green hue. Extension of black coloration as in Figure 1. S9 to 10 largely yellow-orange, except for a diffuse black line on posterior margin of S9, extending in lateral view over the upper two-third of the segment and covering the dorsal spines. S9 dorsally with pair of weak small brown spots. Anterior margin of S10 with two diffuse black markings, upper posterior margin marked with black. S10 shaped as in Figure 5a–d.

Anal appendages complex. Cerci with only slight indication of apical notch; a prominent inner tooth is clearly visible in lateral view, is apically rounded, directed upwards and posteriorly at about an angle of 45° (Figure 5a) and has a small but distinct apical black-marked hook and a proximally directed process situated about halfway along its length (Figure 5c). Cerci of about the same length as S10, yellow-orange, lateral parts brown-black. Paraprocts reaching slightly beyond halfway the length of cerci, apically rounded, with a minute black thorn; otherwise dirty yellow-orange (Figure 5b).

Measurements (mm). Fw length 21.5, hw length 20.0. Abdomen length including appendages 32.0.

Female (Paratype, Figures 3, 6a–c)

Head. Labium, including movable hook and end-hook, and genae yellow-white. Labrum yellow-brown, with mediobasal dark spot. Ante- and postclypeus yellow-white to yellow-brown, dorsal surface of postclypeus largely covered by a diffuse black marking. Frons, up to level of anterior ocellus, including antennal socket and scapus, matt yellow, pedicellus reddish-brown, flagellum



Figure 7. Talpos River, habitat at the type locality of *Pseudagrion woodlarkensis* sp. nov (Photo: S.J. Richards).

dark-brown. Vertex almost entirely covered by a black stripe which continues on occiput as a pair of smaller stripes. Occiput otherwise marked with yellow as in the male, but postocellar spots paler (Figures 3, 6a). Rear of head deep black.

Thorax. Prothorax in shape and coloration similar to male, but lateral spots on median lobe subtriangular instead of subrectangular; bright markings yellow-white instead of yellow-orange. Two anteriorly directed horns rise dorsally from posterior lobe, the proximal 3/5 close to median lobe, apical 2/5 bent distinctly upwards in lateral view (Figure 6c), tapering distally; horns in posterior dorsal view diverging at an angle of about 45°, their tips bent laterally. Legs similar in coloration to male but paler (Figures 3, 6b).

Wings clear; Pt as in male. Fw with 14 Px, Hw 12–13 Px.

Synthorax similar to male, but bright areas yellow-white instead of yellow-orange (Figure 6b). Venter of synthorax yellow-white except for a black spot in the middle of anterior half, a pair of lateral black spots at about the level of the beginning of posterior third of synthorax and some diffuse brownish markings. Pro- and synthorax, proximal parts of legs and anterior part of abdomen white-pruinose.

Abdomen. Largely yellow-white, dorsum black (Figure 3). Valvae yellow-orange. Cerci about half length of S10, slightly directed downwards. Cerci and styli darker than abdominal ground colour, turning to medium to dark brown, tips of styli yellow-orange.

Measurements (mm). Fw length 23.0, hw length 21.5. Abdomen length 30.5.

Habitat and distribution

Pseudagrion woodlarkensis perched in large sunny patches on low vegetation overhanging small (~ 1–10 m wide) clear rocky and sandy streams (Figure 7). They were seen only along streams retaining abundant riparian vegetation flowing through moderately disturbed lowland (< 110 m asl) rainforest. The species is currently known from several streams in south-central Woodlark Island in Milne Bay Province, Papua New Guinea (Figure 8). Given the low relief and generally uniform terrain of Woodlark, and the detection of this species in moderately disturbed habitats, it probably has a broad distribution across the island.

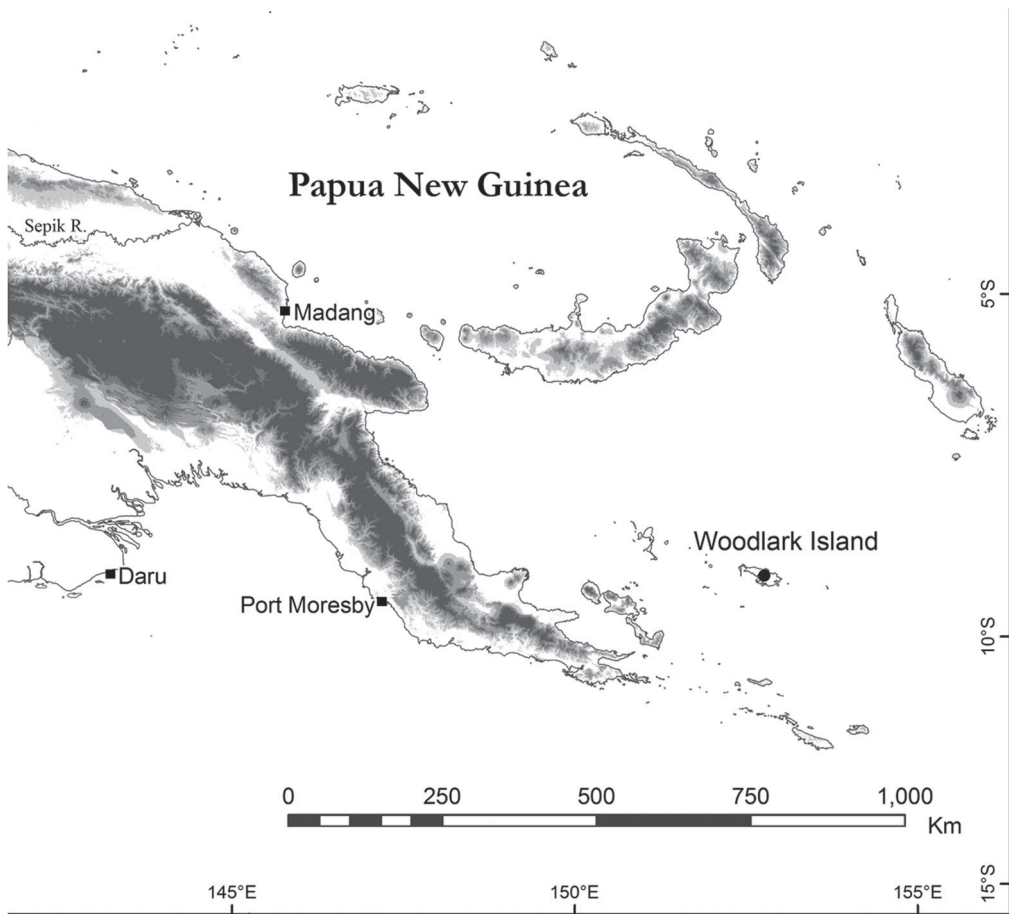


Figure 8. Distribution of *Pseudagrion woodlarkensis* sp. nov.

Discussion

The new species is clearly distinguishable from all other regional species of the genus by the characteristic male anal appendages. Only *P. fumipennis* from New Guinea and *P. ustum* Selys, 1876 from South Sulawesi and the Moluccas share similarly complex appendages (Michalski, 2012). In all three species the cercus bears a conspicuous inner tooth that is visible in lateral view but in both *P. fumipennis* and *P. ustum* this projection is thorn-shaped in lateral view, versus apically rounded in *P. woodlarkensis*. In addition in *P. fumipennis* and *P. ustum* the upwardly directed tooth is at right angles to cercus (Polhemus, Michalski, & Richards, 2008; Ris, 1913) while it is directed both upwards and posteriorly at an angle of about 45° in *P. woodlarkensis*. The new species is also distinguishable from all other yellow-faced Papuan *Pseudagrion* species by having distinct black stripes covering and/or joining the humeral and second lateral sutures.

Pseudagrion woodlarkensis joins *Selysioneura virgula* Lieftinck, 1959 as the second odonate species that may be endemic to Woodlark Island (Polhemus, Allen, & Englund, 2004).

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